DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I, claims 21-34, in the reply filed on 6/22/2009 is acknowledged. The traversal is on the ground that "a search for the invention of Group I should cover many of the areas that are also relevant for the invention of Group II and vice versa. Thus, the search and examination burden would not be serious". This is not found persuasive because evidence of lack of unity between the two groups is found in US 5,858,526 wherein it is found to disclose the feature of instant claim 1 (see 102 rejection below). Therefore, the special technical features of the claimed invention are not found to define a contribution over the prior art, and no single general inventive concept exists. Furthermore, the search required for each Group of claims requires a different field of search therefore causing a serious burden on the Examiner. Thus, restriction is appropriate.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 35-50 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 6/22/2009.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 21, 22, 24, 30, 31, 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Floch et al. (US 5,858,526).

5. Regarding claim 21, Floch et al. disclose a crystalline substrate comprising an optical multi-layer system thereon (Fig. 5), which substrate is obtainable by (a) applying a first free-flowing composition (*Fig. 5, 1st layer 11*) which comprises nanoscale inorganic solid particles (metal oxide colloids) (*col. 5, lines 20-28 and col. 11, lines 55-58*) comprising at least one of a polymerizable and a polycondensable organic group (*col. 5, lines 29-33*) to at least one surface of a crystalline substrate (*Fig. 5, substrate 17; col. 6, line 65 and col. 7, lines 25-28*); (b) at least one of polymerizing and polycondensing the organic groups of the solid particles to form a first organically crosslinked layer on the at least one surface (*col. 6, lines 1-5 and col. 14, lines 18-20)*; (c) applying a second free-flowing composition (*Fig. 5, 2nd layer 11 or layer 25*) which comprises nanoscale inorganic solid particles (metal oxide colloids) comprising at least one of a polymerizable and a polycondensable organic group (*col. 5, lines 20-33*) to the organically crosslinked layer of (b), the second composition giving rise to a different refractive index than the first composition (*col. 6, lines 30-54 and col. 8, lines 25-34*); (d) at least one of polymerizing and polycondensing the organic groups of the solid particles of the applied second composition to form a second organically crosslinked layer on the first organically crosslinked layer (*col. 6, lines 1-5 and col. 14, lines 18-20*); (e) optionally, applying a further free-flowing composition (*Fig. 5, 3rd layer 11*) which comprises nanoscale inorganic solid particles (metal oxide colloids) comprising at least one of a polymerizable and a polycondensable organic group to the organically crosslinked layer of (d) and at least one of polymerizing and polycondensing the

organic groups of the solid particles of the further composition to form a further organically crosslinked layer on the second organically crosslinked layer (*col. 1, lines 20-34 and col. 6, lines 1-5*); (f) optionally, repeating (e) one or more times to form one or more further organically crosslinked layers (*col. 15, lines 38-40*). The limitation "single-stage thermal consolidation of the organically crosslinked layers present and burnout of organic constituents thereof; with the proviso that for the uppermost layer, (1) the at least one of polymerizing and polycondensing of the organic groups of the solid particles of the applied composition to form an organically crosslinked layer may optionally be effected concurrently with (g), or (2) alternatively and optionally, the nanoscale inorganic solid particles do not comprise a polymerizable or polycondensable organic group, so that, in this case, for the uppermost layer, a polymerization or polycondensation of groups of the solid particles with formation of organic crosslinking does not take place before or during (g)" is a method limitation and does not determine the patentability of the product. The method of forming the product is not germane to the issue of patentability of the product itself, unless Applicant presents evidence from which the Examiner could reasonably conclude that the claimed product differs in kind from those of the prior art. See MPEP 2113. There does not appear to be a difference between the prior art structure and the structure resulting from the claimed method because, as clearly shown above, Floch et al. disclose the same structure of the claimed crystalline substrate as recited in claim 21.

Furthermore, it is to be pointed out that claim 21 defines the product by how the product was made. Thus, claim 21 is a product-by-process claim. For purposes of examination, product-by-process claims are not limited to the manipulation of the recited steps, only the structure implied by the steps. See MPEP 2113. In the present case, the recited steps imply a structure

having a crystalline substrate comprising a first free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group applied to at least one surface of a crystalline substrate and at least one of polymerizing and polycondensing the organic groups of the solid particles to form a first organically crosslinked layer on the at least one surface; and a second free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group applied to the first organically crosslinked layer and the second composition giving rise to a different refractive index than the first composition; and at least one of polymerizing and polycondensing the organic groups of the solid particles of the applied second composition to form a second organically crosslinked layer on the first organically crosslinked layer; and optionally, applying a further free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group to the second organically crosslinked layer and at least one of polymerizing and polycondensing the organic groups of the solid particles of the further composition to form a further organically crosslinked layer on the second organically crosslinked layer; and optionally, having one or more further organically crosslinked layers. As clearly described above, Floch et al. suggests such a product.

Regarding claim 22, Floch et al. disclose the crystalline substrate comprising silicon (*col. 7, lines 26-27*).

Regarding claim 24, Floch et al. disclose the crystalline substrate being planar (*Fig. 5, substrate 17*).

Regarding claim 30, Floch et al. disclose the nanoscale particles (colloids) comprising oxides (*col. 5, lines 24-28*).

Regarding claim 31, Floch et al. disclose the polymerizable organic groups comprising organic radicals which comprise a vinyl group (*col. 5, lines 29-34*).

Regarding claim 33, the optical multi-layer system in Floch et al. comprises an interference layer system (*col. 4, lines 41-53*).

Regarding claim 34, the optical multi-layer system in Floch et al. comprises an antireflection layer system (*col. 5, lines 3-4*).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 21-28, 30, 31, 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig et al. (US 6,455,103) in view of Edwards (US 3,493,289).

8. Regarding claims 21, 22, 23 and 26, Mennig et al. disclose a glass substrate comprising an optical multi-layer system thereon, which substrate is obtainable by (a) applying a first free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group to at least one surface of a glass substrate (*col. 1, lines 49-53*); (b) at least one of polymerizing and polycondensing the organic groups of the solid particles to form a first organically crosslinked layer on the at least one

surface (*col. 1, lines 54-56*); (c) applying a second free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group to the organically crosslinked layer of (b), the second composition giving rise to a different refractive index than the first composition (*col. 1, lines 57-60*); (d) at least one of polymerizing and polycondensing the organic groups of the solid particles of the applied second composition to form a second organically crosslinked layer on the first organically crosslinked layer (*col. 1, lines 61-63*); (e) optionally, applying a further free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group to the organically crosslinked layer of (d) and at least one of polymerizing and polycondensing the organic groups of the solid particles of the further composition to form a further organically crosslinked layer on the second organically crosslinked layer (*col. 1, lines 64-67*); (f) optionally, repeating (e) one or more times to form one or more further organically crosslinked layers (*col. 1, lines 64-67*), and (g) single-stage thermal consolidation of the organically crosslinked layers present and burnout of organic constituents thereof; with the proviso that for the uppermost layer (*col. 2, lines 1-3 and col. 7, lines 62-67*), (1) the at least one of polymerizing and polycondensing of the organic groups of the solid particles of the applied composition to form an organically crosslinked layer may optionally be effected concurrently with (g) (*col. 7, lines 51-61*), or (2) alternatively and optionally, the nanoscale inorganic solid particles do not comprise a polymerizable or polycondensable organic group, so that, in this case, for the uppermost layer, a polymerization or polycondensation of groups of the solid particles with formation of organic crosslinking does not take place before or during (g) (*col. 7, lines 51-61*).

Mennig et al. fail to disclose a crystalline transparent substrate, such as quartz, which is one of a precious stone and a semi-precious stone.

Edwards discloses a multi-layer coated optical device including a transparent substrate, such as glass or quartz (*col. 4, lines 55-56*). Thus, Edwards shows that both glass and quartz can be used as a substrate in an optical device since both are transparent materials. Therefore, glass and quartz are equivalents materials for use as a transparent substrate in an optical device.

Mennig et al. teach a multi-layered optical system including a glass substrate. Thus, because glass and quartz were art-recognized equivalents at the time the invention was made, as shown by Edwards, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute quartz, a semi-precious stone, for glass as the substrate in Mennig et al. in order to provide a transparent crystalline substrate for an optical system.

Furthermore, it is to be pointed out that claim 21 defines the product by how the product was made. Thus, claim 21 is a product-by-process claim. For purposes of examination, product-by-process claims are not limited to the manipulation of the recited steps, only the structure implied by the steps. See MPEP 2113. In the present case, the recited steps imply a structure having a crystalline substrate comprising a first free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group applied to at least one surface of a crystalline substrate and at least one of polymerizing and polycondensing the organic groups of the solid particles to form a first organically crosslinked layer on the at least one surface; and a second free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group applied to the first organically crosslinked

layer and the second composition giving rise to a different refractive index than the first composition; and at least one of polymerizing and polycondensing the organic groups of the solid particles of the applied second composition to form a second organically crosslinked layer on the first organically crosslinked layer; and optionally, applying a further free-flowing composition which comprises nanoscale inorganic solid particles comprising at least one of a polymerizable and a polycondensable organic group to the second organically crosslinked layer and at least one of polymerizing and polycondensing the organic groups of the solid particles of the further composition to form a further organically crosslinked layer on the second organically crosslinked layer; and optionally, having one or more further organically crosslinked layers. As clearly described above, the combination of Mennig et al. and Edwards suggests such a product.

Regarding claims 24 and 25, Mennig et al. fail to specifically disclose the substrate being either planar or curved. It would have been an obvious matter of design choice to change the shape of the substrate in Mennig et al. to be either planar or curved, since such a modification would have involved a mere change in the shape of the substrate. A change in shape is generally recognized as being within the level of ordinary skill in the art, absent unexpected results. MPEP 2144.04 (IV).

Regarding claim 27, Mennig et al. disclose two sides of the substrate being provided with an optical multi-layer system (*col. 9, lines 34-42*).

Regarding claim 28, Mennig et al. disclose the substrate comprising a sheet (*col. 9, line 34*).

Regarding claim 30, Mennig et al. disclose the nanoscale particles comprising one or more compounds selected from oxides, sulfides, selenides and tellurides of semimetals and metals (*col. 2, lines 51-55*).

Regarding claim 31, Mennig et al. disclose the polymerizable or polycondensable organic groups comprising organic radicals which comprise at least one of a (meth)acryloyl group, a vinyl group, an allyl group and an epoxy group (*col. 3, lines 25-30*).

Regarding claim 33, Mennig et al. disclose the optical multi-layer system comprising an interference layer system (*col. 8, lines 3-5*).

Regarding claim 34, Mennig et al. disclose the optical multi-layer system comprising an anti-reflection layer system (*col. 8, lines 3-5*).

9. Claim 29 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig et al. (US 6,455,103) in view of Edwards (US 3,493,289) as applied to claims 21 and 28 above, and further in view of Forrest et al. (US 6,091,195).

10. Regarding claim 29, Mennig et al. and Edwards teach the claimed crystalline substrate comprising an optical multi-layer system thereon, as shown above.

Mennig et al. and Edwards both fail to teach a crystalline substrate comprising a sheet of sapphire.

Forrest et al. teach an optical device (light emitting display) including a transparent substrate, such as glass, quartz or sapphire (*col. 4, lines 35-37*). Thus, Forrest et al. show that glass, quartz and sapphire can be used as a substrate in an optical device since they all are

transparent materials. Therefore, glass, quartz and sapphire are equivalents materials for use as a transparent substrate in an optical device.

Mennig et al. teach a multi-layered optical system including a glass substrate. Thus, because glass and sapphire were art-recognized equivalents at the time the invention was made, as shown by Forrest et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute sapphire for glass as the substrate in Mennig et al. in order to provide a transparent crystalline substrate for an optical system.

Regarding claim 32, Mennig et al. disclose the nanoscale particles comprising one or more compounds selected from SiO_2, TiO_2, ZrO_2, ZnO, Ta_2O_5, SnO_2 and Al_2O_3 (*col. 2, lines 55-58*) and the polymerizable or polycondensable organic groups comprise organic radicals which comprise at least one of a (meth)acryloyl group, a vinyl group, an allyl group and an epoxy group (*col. 3, lines 25-30*).

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CATHERINE SIMONE whose telephone number is (571)272-1501. The examiner can normally be reached on Monday-Friday 9:30-6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Sample can be reached on (571) 272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Catherine Simone/
Examiner, Art Unit 1794

October 26, 2009